

Unit 4: Operations and Algebraic Thinking: Patterns in Addition and Multiplication

In this unit students will engage in leveled problem-solving sets, games, and other visual/kinesthetic activities to develop and build meaning for the properties and operations of multiplication and division. In this unit, students will cement their facility with basic multiplication and division facts by modeling, representing, and explaining solutions as they explore contextual situations.

Important: Students should continue working with the array cards, 100 charts, and flashcards to learn multiplication and division facts. Remember if they know the multiplication fact, make sure they can say the corresponding division fact.

<http://nces.ed.gov/nceskids/index.asp>

MULTIPLICATION AND DIVISION ARE INVERSE OPERATIONS. THEY NEED TO BE TAUGHT TOGETHER AS STUDENTS EXPLORE ARRAYS AND WORK THROUGH THESE LESSONS.

When students discuss, help them use appropriate mathematical vocabulary as they explain and make observations. Use all problem types to help students develop understanding of how to use the operations of multiplication and division. Students need to discuss and compare strategies and models when explaining solutions. Models to use include: interlocking cubes, color tiles, hundreds charts, base 10 blocks, and number lines. (The number line is a linear model to deepen students understanding of skip-counting, equal groups, and repeated addition. Skip count using numbers 2-10 Compare the tools. Connect number line tool to 100 charts. How are they alike and different?)

Students need to use the array cards and skip-counting charts to learn their multiplication/division facts. This is the age when they are most interested! Embed commutative property, number theory, transformations, and vocabulary when working with cards. USE THESE ALL YEAR!!

In this unit, students will:

- Understand concepts of area and relate area to multiplication and addition.
- Find the area of a rectangle with whole- number side lengths by tiling it.
- Multiply side lengths to find areas of rectangles with whole-number side lengths in context of solving real world and mathematical problems.
- Construct and analyze area models with the same product.
- Describe and extend numeric patterns.
- Determine addition and multiplication patterns.
- Understand the commutative property's relationship to area.
- Create arrays and area models to find different ways to decompose a product.
- Use arrays and area models to develop understanding of the distributive property.
- Solve problems involving one and two steps and represent these problems using equations with letters " n " or " x " representing the unknown quantity.
- Create and interpret pictographs and bar graphs.
- Find area of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts.

The understanding of and ability to use multiplication and division is the basis for all further mathematics work and its importance cannot be overemphasized. As students move through upper elementary grades and middle school, the foundation laid here will empower them to work with fractions, decimals, and percent.

Area is a measure of the space inside a region or how much it takes to cover a region. As with other attributes, students must first understand the attribute of area before measuring.

The concept of multiplication can be related to the area of rectangles using arrays. Students need to discover that the length of one dimension of a rectangle tells how many squares are in each row of an array and the length of the other dimension of the rectangle tells how many squares are in each column. Using this model, students should be able to create arrays to solve real-life problems involving multiplication and apply this concept with addition, subtraction, and division to solve equations involving two steps or more to find the solution.

*adapted from Georgia Department of Education

